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70% CO2 reduction in Amsterdam New-West - The Ecostiler Dialogue on sustainable energy options for housing renovation

van der Woerd, K.F.; Hisschemoller, M.; Bergsma, E.J.; Cornelisse, C.; Hof, H.

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70% Co2 Reduction In Amsterdam New-West

The Ecostiler Dialogue on sustainable energy options for housing renovation

Frans van der Woerd

Matthijs Hisschemöller

Emmy Bergsma

Corinne Cornelisse

With contributions of Hans Hof



R-08/04

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It combines Ecostiler Deliverable 6.8 'Report on the integrated assessment of implementation schemes' in Chapter 4 with Deliverable 6.9 'Report that presents the alternatives that are considered best from a technical, environmental, economic and social point of view' in Chapter 5.

The report was internally reviewed by: Michiel van Drunen

IVM

Institute for Environmental Studies

Vrije Universiteit

De Boelelaan 1087

1081 HV Amsterdam

The Netherlands

T +31-20-5989 555

F +31-20-589 553

E info@ivm.falw.vu.nl

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Abstract

In Amsterdam New-West, major housing refurbishments are taking place. This mainly concerns the 'Westelijke tuinsteden', an area that houses 128.000 people in 60.000 dwellings and was built between 1950 and 1965. Apart from housing renovation, 15.000 new apartments will be constructed. In the policy goals for the Amsterdam New-West area, a 50% CO₂ reduction target is submitted for the 2002 – 2015 period in which the refurbishments shall be taking place.

In the Ecostiler Dialogue¹, residents, housing associations, city district managers and energy-experts have together explored the potentials to meet this reduction target through city renewal. In nine dialogue meetings, held between February 2007 and April 2008, the stakeholders openly talked about desires, opportunities and difficulties associated with sustainable energy. The discussions primarily addressed refurbishments. For new dwellings, an obligation to connect to the local district heating is already in place. The Institute for Environmental Studies (IVM) organized the dialogue.

Exploring the opportunities

The first phase of the dialogue (February – July 2007) concentrated on information sharing about different sustainable energy options. A large array of options has been discussed: from energy saving to production of sustainable energy. Experts presented about housing insulation, Combined Heat and Power generation (CHP) systems, small urban wind turbines, heat pumps and a new - very thin and flexible - variant of PV electricity production. Participants were asked for their level of ambition for sustainable energy in Amsterdam New-West. The ambition was high: Amsterdam New-West could even aspire to become a net supplier of sustainable energy.

Several problems concerning sustainable energy were identified as well during this stage. On the one hand, practical obstacles for the production of solar and wind energy were revealed. On the other hand, an atmosphere of distrust among residents about sustainable energy was presented as a barrier: in the eyes of many residents sustainable energy equals expensive energy. Close consultation with residents is deemed important to overcome this problem. Furthermore, sharing the benefits from sustainable energy measures with residents and pointing out that sustainable energy increases the independence from oil prices could increase acceptance. The dialogue group advises to test new cooperation structures between residents, housing associations and energy companies.

¹ Ecostiler (Energy efficient Community Stimulation by use and Integration of Local Energy Resources) is a European research programme that aims to fundamentally cut back on fossil energy use and CO₂ emissions, mainly through large scale use of sustainable energy and urban district heating. In the United Kingdom, London is starting up a pilot project with heat pumps. In Denmark, plans are prepared to install a biomass based energy plant in a rural area. And in Amsterdam, the focus is on the Amsterdam New-West area where people expect much result from the new urban district heating system.

Elaborating three exemplar housing complexes

The second phase of the Ecostiler Dialogue (August 2007 – March 2008) focussed on three housing complexes in Amsterdam New-West that are actually going to be renovated. The complexes are typical buildings of Amsterdam New-West. For each building, energy expert Hans Hof from Europe's Energy Point developed two different energy scenarios. Every scenario tries to find an optimal balance between insulation and energy monitoring (energy saving) on the one hand, and production of sustainable energy on the other. Also, each scenario is accompanied by a costs-and-savings calculation. In three sessions – each session elaborated on one housing complex – participants assessed the scenarios. Using the method of 'peeling' – removing those measures from the scenario that participants do not deem feasible or affordable – the outcome of these sessions were ambitious and realistic scenario's that take account of different stakes and desires.

Several conclusions can be drawn from this phase. Most importantly, implementing sustainable heat at the level of a housing complex proves to be easier than implementing sustainable electricity. Solar and wind energy are expensive techniques that are often quite difficult to apply to existing buildings, because of a lack of roof space for solar panels and wind turbines and a bad roof orientation. Furthermore, institutional barriers that obstruct local exchange of self-produced sustainable electricity through the public electricity network hamper the implementation of sustainable electricity measures. The alternative, collective purchasing of green electricity, is currently not (yet) entirely CO₂ neutral, amongst other things because non-sustainable biomass is used as a source. Only 'natuurstroom' (natural electricity), produced from solar, wind and sustainable biomass, is fully sustainable but also more expensive.

Conclusions from the dialogue

Renovations at the level of a housing complex offer the opportunity to reduce the CO₂-level with 70%. This is achieved through a combination of:

1. Insulation measures,
2. A switch to heat pumps or urban district heating, with heat pumps being the more attractive solution, and
3. Purchasing green electricity.

These measures can be put in practice with an investment level varying from 15.000 to 35.000 euros per dwelling. Implementing these measures will lower the energy costs of residents, and improve their living quality directly. Even when the investment costs are partially passed on to tenants through a rent increase, the total living costs for tenants do not have to increase. An additional advantage is that energy prices are disconnected from the rising oil and gas prices.

However, some sustainable energy renovations require extra investments costs, mainly for funding new heat distribution systems within and near building complexes. This could give rise to an 'unprofitable top' in investment costs, which means that investment costs can not be recovered from lower energy bills or higher rents. In these cases, the dialogue group advises to discuss a fair distribution of those costs between all stakeholders involved.

On top of the above-formulated conclusion, the dialogue group concludes that even a 90% CO₂ reduction is possible. This does require the use of entirely sustainable electricity and heating.

Entirely sustainable electricity and heating demands involvement from higher policy levels. Housing associations, city districts, residents, the municipality of Amsterdam and in some instances the national government, should cooperate to guarantee this.

Based on these conclusions, the contribution of Amsterdam New-West towards the Dutch climate policy goals has been assessed. Two assumptions are underlying this assessment. First, 90% CO₂ reduction is feasible for renovation buildings. And second, for new buildings, climate neutrality can be realized. Following these assumptions, Amsterdam New-West can structurally save 0.5 megaton CO₂.

To put the conclusions of the Ecostiler Dialogue in practice, participants formulated several recommendations aimed at specific stakeholders.

At the level of a housing complex or a local conglomeration of complexes:

- Communicate the conclusions of the Ecostiler Dialogue to people within city districts and housing associations who actually decide upon the content of renovations. What implications do the conclusions have for their daily work?
- Involve residents in an early stage of sustainable renovation plans. Be honest about the different aspects and be open to alternatives.
- Examine new cooperation structures to assess and distribute the costs and benefits of sustainable energy measures. An energy contract that guarantees stable prices for more than one year can relieve residents from fluctuations in energy prices. Benefits can be shared with residents.
- Do not only pay attention to the CO₂ reduction and associated costs when thinking about sustainable energy. Also take the consequences the measures have on the quality of living inside the dwelling into account.
- Disturbances as a result of building- and reconstruction activities can be very troublesome to residents. This is no reason to stop every initiative: it is reason to investigate creative solutions to minimize the disturbance. The market is increasingly offering these kind of solutions.

At the level of a city district:

- City districts can play an important facilitating role. For example, they can evaluate the necessary permits. Also, they can anticipate the judgements of advisory bodies that often vote against the implementation of sustainable energy measures because they - in their eyes - impair the external appearance of buildings. It is advised to set up agreements around these problems, when necessary at the level of the Amsterdam municipality.
- Although city districts have a limited array of policy instruments, they can explore how the instruments that they do have can be used in favour of sustainable energy.

At the level of the Amsterdam municipality

- Make an inventory of all opportunities to stimulate the decentral production of electricity, together with housing associations, city districts, companies and other stake-

holders. What are the possibilities to cost-effectively produce electricity? Decisiveness and creativity should be a condition.

- The municipality could place launching orders at suppliers of solar PV or small wind turbines, to lower the start-up costs for innovative suppliers.
- For sustainable electricity that is not produced locally or decentrally, housing associations could develop collective arrangements. Collectively buying green electricity can provide a good alternative with financial benefits for residents. Again, the preferable option should be buying 100% clean electricity ('*natuurstroom*').
- The municipality has the capabilities to remove institutional barriers in cooperation with energy companies and electricity network managers.

At the level of the Netherlands as a whole:

- The dialogue group proposes a change of the system for so-called 'rental points'. With this system, an acceptable rent rate is established. In the future, the system should focus on the total costs of living (including energy costs) and not only take the rent into account, as it does currently.
- The national subsidy to stimulate sustainable energy (SDE), should also encourage the use of self-produced sustainable solar energy to make this a favourable option.
- Highly innovative solutions require Amsterdam New-West to appeal to national financing mechanisms, like the 'Unieke Kansen Regeling' (Unique Chances Arrangement). Cooperation between different parties can improve the status of a submitted proposal.

Closing remarks

The participants are enthusiastic about the results of the Ecostiler Dialogue. They would like to share the results with the people that actually work with sustainable energy in practice. To this end, workshops and presentations will be held to communicate the results to other stakeholders: housing associations, city districts, residents and other interested parties. Those efforts will enlarge the acceptance of the desirability and viability of sustainable energy measures.

To put the results into practice, bottom-up as well as top-down initiatives are necessary. Therefore it is important to display Amsterdam New-West as an area in which 70% CO₂ reduction will be achieved.

1. Introduction

In the policy goals for Amsterdam New-West, it is submitted that the CO₂ emission level of the area should have dropped by half in 2015, after completing the planned renovations. In the Ecostiler Dialogue, several stakeholders have together explored the opportunities to fulfil this policy goal. Residents, housing associations, local district managers and energy experts have discussed sustainable energy measures that can be applied during the housing renovations in Amsterdam New-West. The dialogue consisted of nine dialogue meetings that took place in the period from February 2007 to April 2008.

This document constitutes the final report of the Ecostiler Dialogue. In this introduction, we will first depict the aims of the Ecostiler project, of which the dialogue was part. Second, we will describe the main characteristics of the Amsterdam New-West area. And last we will explain the different phases of the dialogue on which this report is structured.

1.1 The Ecostiler Research Programme

Ecostiler (Energy efficient Community Stimulation by use and Integration of Local Energy Resources) is part of the larger European CONCERTO programme. With the CONCERTO programme, the European Union encourages the use of sustainable energy and energy efficiency techniques at the level of communities.

Ecostiler aims to fundamentally reduce the use of fossil fuels and thus CO₂ emissions, mainly through the large-scale application of sustainable energy sources and urban district heating. Apart from technical and ecological aspects, socio-economical circumstances of sustainable energy are studied as well. Pilot projects take place in London (biomass feed urban district heating, small urban wind turbines, housing insulation), Denmark's Mølbjerg (rural area: local energy from biomass and wind, saving energy) and Amsterdam's New-West. Ecostiler started in September 2005 and will continue for five years.

In Amsterdam, KEMA (research and advisory organization on energy) is managing the project. Other organizations participating are 'AfvalEnergieBedrijf Amsterdam' (AEB: intended supplier of energy), 'WestPoortWarmte' (WPW: distributor of heat), Amsterdam 'Dienst Milieu & Bouwtoezicht' (DMB: Inspection Department for Environment and Building) and the Institute for Environmental Studies (IVM: research institute conducting the socio-economical pillar of the research) are taking part in the research programme. The IVM organized an interdisciplinary project to conduct its research: an open dialogue with relevant stakeholders in which several alternatives for drastic CO₂ reduction were elaborated. This report is the end product of the dialogue.

1.2 City renewal in Amsterdam New-West

At this moment, Amsterdam New-West is subject to the largest city renewal operation in the Netherlands. In the almost overlapping area 'Westelijke Tuinsteden', built between 1945 and 1965 and housing 128.000 inhabitants in 60.000 dwellings, major refurbishments are scheduled. On top of that, 15.000 new dwellings will be constructed. To ade-

quately deal with technical, spatial and social dilemmas, the city of Amsterdam and the city districts Osdorp, Slotervaart, Geuzenveld/Slotermeer and Bos en Lommer together founded 'Bureau Parkstad' (Agency Parkstad) in 2002 to manage the city renewal project. In one of the environmental policy goals of Bureau Parkstad, a CO₂ reduction percentage of 50 has been set for the period between 2002 and 2015, the period in which the city renewal will take place.

In 2005, it was decided to install a new district heating system in Amsterdam New-West. The system will be fuelled by residual waste heat from the regional waste incineration plant and biogas from sewage treatment. The overall energy-efficiency rate is expected to be 94%. All newly build dwellings will be connected to the district heating system; renovated buildings could be connected as well but no obligations apply. Bureau Parkstad aims for renovation buildings to exceed the current insulation standard by 20%. This will be supplemented by photovoltaic (PV) panels, small wind turbines and larger wind energy projects.

In 2007, the city renewal operation has been reviewed². It was decided to abolish Bureau Parkstad, but to maintain the 50% reduction target for Amsterdam New-West. Housing associations have been given a more active role in the renovations: they will increase their investments in public services (schools, public buildings) and the public open space. The four city districts will concentrate on social and economical revitalization within their district. To realize the 50% reduction target, a lot of measures that will directly impact the live of residents will be necessary.

1.3 Structure of the Report

In preparation of the dialogue, IVM interviewed 15 stakeholders in the period November 2005 – January 2006. Among the stakeholders were housing associations, city district managers and residents organizations. The outcomes of the interview round can be found in Working Document 1 of the dialogue³. In chapter 2, we summarize the most important conclusions of this preparatory phase.

In the second half of 2006, we contacted many organizations in Amsterdam New-West to participate in the dialogue. We made a distinction between residents and those who are professionally involved with Amsterdam New-West. In Appendix 1 the invitation letter for the first category is submitted, and in Appendix 2 the invitation letter for the last category can be found. By the end of 2006, a list of 30 interested parties was compiled, equally incorporating residents, housing associations and city district managers.

Those 30 parties participated in the dialogue. They discussed their desires, and their views on the opportunities, limits and obstacles for sustainable energy in Amsterdam New-West. As will be obvious in an open dialogue process, all parties were considered equal. Participants only spoke on behalf of themselves. Although some participants brought with them important information from their organization, the recommendations

² Amsterdam- Bureau Parkstad (2006), *Herziening Richting Parkstad 2015*. Available from: www.parkstadamsterdam.nl.

³ Woerd, F. van der *et al.* (2006). *Inzichten uit de interviews met stakeholders Ecoster Amsterdam*, with an English summary, Rapport W-06/12, IVM-VU, Amsterdam.

of the dialogue are not binding for those organizations. The dialogue does however offer ample opportunities for broadening support for the recommendations.

The main aim of the first phase of the dialogue (February 2007 – July 2007) was to share knowledge and information between stakeholders about different ways to integrate sustainable energy in renovation plans. Energy saving measures (for the most part insulation) as well as sustainable energy production measures have been discussed. A report of this phase is to be found in Working Document 2 of the dialogue⁴. The main conclusions are summarized in Chapter 3.

At the end of the first phase, the participants determined the focal points of the second phase of the dialogue. They decided that the dialogue should focus on renovation buildings, because for new buildings quite some requirements are in place. For example, it is certain that new buildings are to be connected to the district heating system. Moreover, in the Netherlands, for new buildings an ‘Energy Performance Target’ is laid down in law. These requirements are lacking for renovation buildings. Even in the policy goals of Amsterdam New-West, no CO₂ requirements are included for renovation buildings. Furthermore, it was decided that the dialogue should focus on porch-apartment buildings and galleried flats; both types are characteristic for the area of Amsterdam New-West.

In the second phase (September 2007 – December 2007), the Ecostiler Dialogue concentrated on ‘actual practice’, by studying three housing complexes in Amsterdam New-West that are on the list to be renovated: What energy measures are attainable in those complexes, against what costs and benefits? To answer this question, energy expert Hans Hof from Europe’s Energy Point (www.energy-point.com), commissioned by the IVM and the city districts, developed two energy scenarios for each complex⁵. Chapter 4 explains the core elements of the scenarios and the main discussion points.

To complete the dialogue, a concluding dialogue meeting was held in April 2008. In this meeting, recommendations regarding desirable and attainable packages of sustainable energy measures for housing renovation in Amsterdam New-West were outlined. Also, recommendations about the method to develop such packages were drawn, i.e. about the usefulness of a dialogue process, of scenarios and of the so-called ‘peeling method’. Chapter five outlines these recommendations. In Chapter 5, we differentiate between three types of recommendations:

1. Those relating to content: What level of CO₂ reduction is desirable and attainable for housing renovation?
2. Those relating to agreements and arrangements: What can and should stakeholders do to achieve this target?
3. Those relating to the dialogue process: What lessons can be learned from the dialogue process itself, and from the ‘peeling method’?

The recommendations are in first instance aimed at the involved housing associations, the city district employees and residents in Amsterdam New-West. However, the

⁴ Woerd, F. *et al.* (2007) Verslag eerste vier bijeenkomsten Ecostiler Dialoog, with an English summary. Rapport W-07/21, IVM-VU, Amsterdam.

⁵ Europe’s Energy Point (Hans Hof; 2007). Milieutechnische en economische uitwerking van CO₂-besparende maatregelen bij drie wooncomplexen in Amsterdam Nieuw West, Eefde.

recommendations could have a broader scope. Everywhere, people are trying to deal with the climate problem by implementing sustainable energy measures and creating support. The municipality of Amsterdam recently formulated an ambitious policy goal: to reduce the CO₂ emission in the city by 40% in 2025, using 1990 as the base year⁶. Achieving this goal demands active contributions from all sectors in society. As this report will show, the renovation of houses build in the after war period provides good opportunities to drastically cut back on CO₂ emissions. It would be a waste not to use these opportunities, starting in Amsterdam New-West.

⁶ Gemeente Amsterdam (2007) Amsterdam duurzaam aan de top, Milieubeleidsplan 2007 – 2010. Available from: www.dmb.amsterdam.nl.

2. Interviews with stakeholders

In preparation of the dialogue, the IVM interviewed 15 stakeholders, amongst who were local district managers, housing associations and resident organizations. This chapter provides an overview of the most important result of this preparation phase. Appendix 3 contains a list of all the interviewed persons and organizations. A full and extended analysis of the results can be found in Working Document 1⁷.

In this chapter, we will first discuss the views of local district managers, housing associations and resident organizations on sustainable energy. Next, we will shortly treat the sustainable energy options (SEO) that the respondents deemed important. Last, we will reflect the expectations of respondents concerning the dialogue.

The four interviewed *city district managers* are favourably disposed towards city district heating as they have committed their support to the construction of the district heating system. Practices concerning other SEO differ from district to district. Some city districts are actively involved: they apply SEO like PV panels and heat and cold storage to their own buildings or schools in their district. Two out of four city districts appeared to be hardly active with sustainable energy. Strikingly, not much attention is being paid to the high potential of utility buildings, like offices and hospitals.

The ambitions of the six interviewed *housing associations* – who together own 80% of the housing stock in Amsterdam New-West – vary greatly. Some associations are satisfied with living up to the energy standards laid down in national legislation. Others endeavour ambitious plans for sustainable energy. The result is an unorganized template of activities:

- Most housing associations have signed city district heating contracts, with the exception of two;
- No standards for sustainable energy during housing renovations have been developed
- Every renovation project is subject to an extended discussion on SEO and consequences for the rent.

Resident organizations are suspicious towards urban district heating. The general mistrust of housing associations and energy companies, and a lack of knowledge and involvement of residents in decision processes, seem to be important in this matter. Residents especially fear high prices. On the one hand, this could be caused by the monopoly of the heat supplier, on the other by the lowering of insulation standards for dwellings that are connected to the district heating system. Also, most residents resist electric cooking.

Amsterdam New-West inhabits many immigrants from Morocco and Turkey. Direct and intensive communication will be necessary to reach this group. With extra information and effort, we hope it will be possible to involve this group in our dialogue.

⁷ Woerd, F. van der *et al.* (2006). Inzichten uit de interviews met stakeholders Ecostiler Amsterdam, Rapport W-06/12, IVM-VU, Amsterdam.

Reaching the 50% reduction target requires more than installing city district heating. Other SEO must be applied. Most popular among the interviewed are: housing insulation, heat pumps and PV panels. Other options mentioned are green electricity, wind energy and building an eco-district. However, these suggestions are hardly elaborated.

The importance of publicity and visibility of pilot projects is stressed. Difficulties are foreseen concerning the higher costs of sustainable energy, and the lack of rules and regulations for housing renovations and rent regulations with the result that investments cannot be passed on through rent increases.

Concerning the outcome of the dialogue, the respondents have four expectations. Note that the respondents were interviewed before the start of the dialogue.

1. Structurally placing sustainable energy and district heating on the political and public agenda.
2. Educating and advising about sustainable energy and district heating.
3. Discussing the pros and cons of city district heating fundamentally.
4. Developing SEO for housing renovation in Amsterdam New-West.

It is recommended for the dialogue to follow existing organizational structures, like resident organizations and tenant organizations.

3. Possibilities for sustainable energy

The main aim of the first phase of the dialogue (February - July 2007) was to exchange information about the numerous possibilities to integrate SEO in renovation plans. Energy saving (primarily insulation) measures as well as technologies that produce sustainable energy were discussed. In this chapter, the key points of these discussions are summarized. In Appendix 4, a list of participants and presenters is presented. A full description of the first four dialogue meetings can be found in Working Document 2 of the dialogue⁸.

The first four dialogue meetings outlined participants' preferences for specific SEO in Amsterdam New-West. The deemed pros and cons of those SEO were pronounced. Also, circumstances that can encourage or obstruct the implementation of SEO were discussed.

The aspirations of participants proved to be high. Although a passive house may not be accomplishable; energy neutrality could be used as a starting point in refurbishing plans. Consensus was easily reached on the importance of good insulation to save energy. Another SEO that most participants qualified as desirable is solar energy, more specifically solar boilers.

Participants expressed a mild scepticism towards wind energy. Opinions differed on the potential of the micro combined heat and power (micro-CHP). City district heating does not seem to be one of the favourable options. Participants attach great value to qualities like small-scale decentralism, flexibility and freedom of choice and city district heating does not fulfil any of those qualities. Greenhouses as a source of energy, insulation of outer walls (wrapping the whole building), collectively buying green electricity, and hot fill equipment are also deemed attractive, although those options were not extensively discussed during the meetings.

Furthermore, participants stressed the importance of health aspects. Some emphasised improvements that result from installing SEO: more hot water, less cold airflows and less sound nuisance. Others pointed to potential negative consequences of SEO: deterioration of the physical health conditions within houses, disturbance of the 'city outlook' and impairment of buildings.

In this phase, the circumstances under which SEO are implemented were substantively discussed. This theme can be split in two. First, there was a discussion on the distribution of costs and benefits. As stated above, residents fear cost increases in energy prices and in rent. Housing associations are looking for a way to distribute costs and benefits equally among parties: they are not willing to bear all investment costs of sustainable energy options while residents enjoy a lower energy bill. In the end, participants agreed that raising the rent is only acceptable when the level of comfort is raised as well as a result of the implementation of SEO.

Second, the involvement of residents was a topic of discussion: when, how and to what extent should residents be involved in the implementation of SEO? Housing associations

⁸ Woerd, F. van der *et al.* (2007) Verslag eerste vier bijeenkomsten Ecostiler Dialoog. Rapport W-07/21, IVM-VU, Amsterdam.

sometimes encounter a great deal of resistance from residents when they are trying to put sustainable energy measures in place. Residents in turn, argue that this resistance is caused by their non-involvement in the decision process. The question when to involve residents appeared to be a hard one to answer. As early as possible seems to be most desirable in first instance, because this way residents will have a voice in all decisions made. But participants are right to state that there is a danger in overloading residents with all kinds of (technical) information out of which they cannot make sense. A middle course was found in the solution to present residents with a small number of energy scenarios of which the viability and feasibility of the measures for the complex under treatment has already been determined. New cooperation structures and (shared) ownership are proposed as a means to improve the communication between housing associations and residents.

Based on the preferences of participants, the second phase of the dialogue involved developing concrete packages of sustainable energy measures for renovation complexes in Amsterdam New-West. The next chapter describes the process of developing those packages.

4. Reducing CO₂ in three housing complexes

The aim of the second phase (September 2007 – December 2007) was to develop concrete and feasible packages of sustainable energy measures, together with new institutional arrangements that provide guidelines about the distribution of the costs and benefits, that can be applied to renovation buildings in Amsterdam New-West. This phase focussed on three building complexes in Amsterdam New-West that are actually on the list to be renovated. Two porch-apartment buildings and one galleried flat were selected because these types of buildings make up a large part of the building stock in New-West. For each of the three complexes, it was examined which measures are more and which are less feasible.

This chapter starts with a brief presentation of the three complexes and accompanying scenarios. After that, we will report on the three sub-sessions in which the three building complexes have been discussed. In the end, we will explain why we are not able to reduce 100% of the CO₂ emissions and present some additional measures that do aim for CO₂ neutrality.

4.1 Complexes and scenarios

This phase consisted of three meetings: one for each building complex. The purpose of each meeting was to discuss two competing energy scenarios that energy expert Hans Hof from Europe's Energy Point developed at forehand. The scenarios are made up of several sustainable energy options (SEO). Also, expected CO₂ reduction, investment costs and financial consequences for households' energy prices and rents are projected for each measure and can be calculated for several measures at the same time. The energy prices in the scenarios use the prices of July 2007 as a basis. The price for gas is set at € 0,43/m³ and the electricity price at € 0,089/KWh. Energy taxes and turnover taxes are excluded from these prices.

Each scenario is realistic as well as ambitious. They are realistic because all the measures in a scenario can in principle be installed at the building complex under discussion. They are ambitious because the scenarios aim for the highest CO₂ reduction rate possible. In reality, it is probably not advisable to apply all measures in a scenario, for example because they are relatively expensive, they don't achieve that much CO₂ reduction or compete with other measures in the scenario. Participants were therefore asked to remove measures from the scenario that – for any reason – they perceived unattainable or unattractive and leave those measures in that they think are feasible and desirable. This method, through which a great variety of SEO is reduced to an attainable, desirable and still ambitious package, is termed 'peeling'.

To offer a variety of options, the collection of all scenarios shows diversity in SEO. Each scenario includes energy saving measures and measures that produce sustainable energy. The measures that produce sustainable energy differ in each scenario. For energy saving measures, a standard package was developed from which for each building those meas-

ures were selected that could be applied at that building. A detailed description of the scenarios can be found in Europe's Energy Point's report⁹.

Burgemeester van Leeuwenlaan

The Burgemeester van Leeuwenlaan (BvL-laan) building complex is built up out of 44 porch-apartments. The first scenario installs two collective water-source heat pumps, which use the nearby ditch as a heat source. Additionally, PVTwins¹⁰ with heat recovery and small urban wind turbines are established. The second scenario places a hydrogen/fuel cell combustion system instead of the water pumps.

Remeijden

Remeijden is an apartment flat in V-shape with a flat roof. The complex contains 180 apartments, distributed among nine floors. In the first scenario, the complex is connected to the city district heating system, and PV twins with heat recovery and small urban wind turbines are installed. In the second scenario, city district heating is replaced by two collective air-sourced heat pumps.

Postjesweg

Along the Postjesweg, three long shaped, five floor high building complexes accommodate 136 porch-apartments. In the first scenario, each apartment gets its own individual air-sourced heat pump. These are supplemented by PVTwins with heat recovery and small urban wind turbines. In the second scenario, two biomass fed CHP plants are built that supply the apartments with heat and if requested cooling. These are again combined with PV twins with heat recovery and small urban wind turbines.

4.2 Assessment of scenarios in sub sessions

Participants to a high extent agreed on desirable and attainable packages for the three complexes. However, this does not mean that no discussions were taking place. In this section, the key points of these discussions will be portrayed.

Strikingly, the different participants performed their task quite similarly. The proposed method of peeling was put aside already in an early stage in every meeting: the scenarios appeared to be too complex. Instead of peeling, participants started looking for a minimal package of measures that should be at the basis of every renovation. This minimal package was thereafter extended with 'extra' measures. The minimal package was elaborated by comparing the CO₂ reduction effects and costs of different measures, to filter out and select those measures that are 'costs effective'.

In every meeting, the effect of insulation was studied first. Table 4.1 displays the effects of insulation. The scenarios differentiate between four degrees of insulation: basic, ambitious, ambitious with double-glazing and ambitious with double-glazing and wrapping the building. Behind the reduction figures, the 'environmental costs effectiveness' (ECE)

⁹ Europe's Energy Point (Hans Hof; 2007). Milieutechnische en economische uitwerking van CO₂-besparende maatregelen bij drie wooncomplexen in Amsterdam Nieuw West, Eefde.

¹⁰ PVTwins are solar panels that produce electricity and heat all together.

is put in brackets. This figure represents the costs (investment costs and saved energy costs) per avoided kilo CO₂. The lower the figure, the higher the environmental cost effectiveness. A negative number indicates a net decrease in costs.

Table 4.1 Effect of insulation for each complex.

CO ₂ reduction and costs effects of insulation for each complex	Basic insulation package	Ambitious insulation package	Double glazing added	Wrapping the building added
BvL-laan	15,2% (€ 0,06)	28,5% (€ 0,15)	37,7% (€ -0,10)	42,1% (€ 2,81)
Remeijden	14,7% (€ -0,13)	28,8% (€ -0,08)	38,7% (€ -0,17)	43,4% (€ 2,28)
Postjesweg	13,8% (€ 0,12)	27,3% (€ 0,22)	36,7% (€ -0,10)	41,1% (€ 3,00)

The effect of insulation on CO₂ emissions is more or less similar for every complex. The environmental costs effectiveness differs more strongly. For example, while installing the ambitious renovation package at Remeijden will save 8 eurocent for every kilo CO₂ avoided, applying the same package to Postjesweg will cost 22 eurocent per avoided kilo.

In every sub session, the conclusion was drawn that the third insulation package (ambitious insulation with double glazing added) is attainable and desirable for housing renovation. This insulation package has the highest environmental costs effectiveness. Wrapping the building was disposed of because it was too expensive relative to the CO₂ reduction it yields.

Extending the results of insulation to Amsterdam New-West as a whole, insulation alone could not fulfil the 50% policy reduction target. The next step undertaken in the meetings therefore was adding the key measure (heat pumps, city district heating, hydrogen, biomass CHP) to the third insulation package. In Tables 4.2 to 4.7, the results – CO₂ reduction and costs – of this step are shown.

Tables 4.2 – 4.7 *Effect of key measure and third insulation package - ambitious insulation with double-glazing - on CO₂ reduction and costs (minimal packages).*

BvL-laan Scenario 1	CO ₂ reduction	Total extra costs a month	Total invest- ment costs per apartment	ECE €/kilo/ CO ₂
Only collective water-source heat pumps ¹¹	50,8%	€ 40	€ 18.670	€ 0,21
Third insulation package added	61,3%	€ 70	€ 32.756	€ 0,30
BvL-laan Scenario 2	CO ₂ reduction	Total extra costs a month	Total investment costs per apartment	ECE €/kilo/ CO ₂
Solar and wind source hydrogen	28,1%	€ 302	€ 37.136	€ 2,81
Third insulation package added	65,3%	€ 307	€ 51.222	€ 1,23
Remeijden Scenario 1	CO ₂ reduction	Total extra costs a month	Total invest- ment costs per apartment	ECE €/kilo/ CO ₂
Only city district heating	54,9%	€ 23	€ 3.500	€ 0,10
Third insulation package added	65,8%	€ 1	€ 13.395	€ 0,00
Remeijden Scenario 2	CO ₂ reduction	Total extra costs a month	Total invest- ment costs per apartment	ECE €/kilo/ CO ₂
Only collective air-source heat pumps ¹²	53,0%	€ 24	€ 2.584	€ 0,11
Third insulation package added	64,9%	€ 23	€ 12.479	€ 0,08

¹¹ In this case high temperature heating systems are chosen, because one of the conditions of the housing association for the renovation of this complex is that inside construction activities should be limited. The high temperature heating systems have a c.o.p. (coefficient of performance: the higher the number, the better the performance) of 4. Would this condition not have been stated, low temperature heating systems with a c.o.p. of 5 could have been a alternative. This would reduce 73% of the current CO₂ emissions, against an investment of €36.556 for each apartment. The environmental costs effectiveness would be €0,27 per kilo avoided CO₂.

¹² These cover 100% of the heat demand.

Postjesweg Scenario 1	CO ₂ reduction	Total extra costs a month	Total invest- ment costs per apartment	ECE €/kilo/ CO ₂
Only individual air-source heat pumps ¹³	44,7%	€ 129	€ 12.602	€ 0,74
Third insulation package added	58,7%	€ 149	€ 28.566	€ 0,65

Postjesweg Scenario 2	CO ₂ reduction	Total extra costs a month	Total invest- ment costs per apartment	ECE €/kilo/ CO ₂
Only biomass CHP	44,3%	€ 175	€ 24.377	€ 1,02
Third insulation package added	58,5%	€ 109	€ 31.691	€ 0,48

From Tables 4.2 to 4.7 it can be derived that adding the key measure to the third insulation package does yield more than 50% CO₂ reduction, the target for Amsterdam New-West. Taking this minimal package as a starting point, participants thought about supplementary measures (building stones). They for example wanted to know how adding the purchasing of green electricity would change the picture. For some building complexes, participants were interested in the effect of monitoring energy use and improved ventilation. In the tables below those effects are presented. The building stones should be read from below. The second line of each table shows the package of measures that participants of the sub sessions deemed desirable and attainable. These form the end result of the second phase of the Ecostiler Dialogue, and from now on will be termed ‘final packages’.

Tables 4.8 – 4.13 *Building stones in the sub sessions. The second row of each table shows the package participants deemed desirable and attainable final packages).*

BvL-laan, Scenario 1	CO ₂ reduction	Total extra costs a month	Total invest- ment costs per apartment	ECE €/kilo/ CO ₂
Collective heat pumps, insulation package 3, purchasing green electricity	70,8%	€ 65	€ 32.756	€ 0,24
Idem, without green electricity	61,3%	€ 70	€ 32.756	€ 0,30

¹³ This measure requires a great deal of construction activities inside the apartments: all existing individual heating systems must be converted to low temperature heating systems.

BvL-laan, Scenario 2	CO ₂ reduction	Total extra costs a month	Total invest- ment costs per apartment	ECE €/kilo/ CO ₂
Wind and solar hydrogen, insulation package 3, additional purchasing green electricity	75,6%	€ 299	€ 51.222	€ 1,04
Idem, without green electricity	69,6%	€ 300	€ 51.222	€ 1,13
Remeijden, Scenario 1	CO ₂ reduction	Total extra costs a month	Total invest- ment costs per apartment	ECE €/kilo/ CO ₂
District heating, insulation package 3, monitoring, purchasing green electricity	72,2%	€ 8	€ 14.878	€ 0,02
Idem, without monitoring	70,9%	€ 3	€ 13.395	€ 0,01
Idem, also without green electricity	65,8%	€ 1	€ 13.395	€ 0,00
Remeijden, Scenario 2	CO ₂ reduction	Total extra costs a month	Total invest- ment costs per apartment	ECE €/kilo/ CO ₂
Collective heat pumps, insulation package 3, ventilation, purchasing green electricity	69,5%	€ 31	€ 13.079	€ 0,10
Idem, without ventilation	70,0%	€ 25	€ 12.479	€ 0,08
Idem, also without green electricity	64,9%	€ 23	€ 12.479	€ 0,08
Postjesweg, Scenario 1	CO ₂ reduction	Total extra costs a month	Total invest- ment costs per apartment	ECE €/kilo/ CO ₂
Individual heat pumps, insulation package 3, ventilation, electric cooking, purchasing green electricity	67,8%	€ 161	€ 29.966	€ 0,61
Idem, without electric cooking & ventilation	68,0%	€ 154	€ 28.566	€ 0,58
Idem, also without green electricity	58,7%	€ 149	€ 28.566	€ 0,65
Postjesweg, scenario 2	CO ₂ reduction	Total extra costs a month	Total invest- ment costs per apartment	ECE €/kilo/ CO ₂
Biomass CHP, insulation package 3, additional purchasing green electricity	58,8%	€ 109	€ 31.691	€ 0,48
Idem, without green electricity	57,8%	€ 113	€ 31.495	€ 0,50

Tables 4.8 to 4.13 demonstrate the effect of purchasing green electricity on top of the minimal package on CO₂ reduction. The effect is substantial: the reduction rate grows by 5 to 9 percent. An exception to this can be found in the second Postjesweg scenario (biomass CHP). This can be explained by the fact that the biomass CHP already produces green electricity and purchasing green electricity has low consequences. In every meeting, purchasing green electricity was added to the minimal package.

Apart from the assessment in meetings, some interesting conclusions can be drawn from a comparison between the six scenarios. Both final packages for the BvL-laan for example, yield a high level of CO₂ reduction. The hydrogen scenario is very expensive compared to the heat pump scenario. This is caused by a lack of sufficient hydrogen production capacity in the area. In the sub session regarding the BvL-laan, most participants therefore rejected the hydrogen scenario. Not everyone however was willing to discard the scenario for its costs. Some found the appeal this measure would have in the neighbourhood worth considering the costs.

Remarkably, city district heating showed positive results, concerning the costs as well as the CO₂ reduction. The competing scenario for Remeijden (collective heat pumps) is more expensive and reduces less CO₂, although the differences are small. The concerns over district heating were discussed already in the first phase of the Ecostiler dialogue. The system is collective meaning that individual households have no choice to be connected or not, households are at the mercy of a large monopoly, and people grow to be reliant on waste¹⁴.

Participants experienced both Postjesweg scenarios as too expensive in relation to the amount of CO₂ they reduced. The main advantage of individual heat pumps is the freedom of choice for households. A big disadvantage is that it requires a lot of construction activities within the apartments. For the involved housing association this was nonnegotiable. For the bio CHP, almost all construction activities take place outside the building complexes, where the CHP will be built. This big advantage is weakened by the fact that the construction of the CHP would take away one of the scarce green areas in the neighbourhood. This could also give rise to problems with applying for a building permit. Both scenarios thus have their advantages and disadvantages. Not surprisingly, the scenarios provoked a lot of discussion. Although for the overall comparison it is extremely useful to have these scenarios considered, it may well turn out that the final packages for the Postjesweg do not lead to concrete recommendations. Therefore, we want to point out that there are many other options for the Postjesweg to substantially reduce CO₂ emissions. Among these are the digestion of household waste, the breathing window and even constructing a greenhouse on top of the roof where CO₂ and heat is exchanged between households and greenhouse.

Looking at the end packages all together, one thing that strikes is the fact that most packages provide a sustainable alternative for producing heat. Producing green electricity on the other hand is in most instances left out in the final packages. This can be explained

¹⁴ The city district heating in this scenario uses residual heat from waste incineration. In preceding dialogue meetings potential municipal plans to also use residual heat from a nearby coal combustion plant as a source for the Amsterdam New-West district heating were brought to the fore. Would these plans pass through, dependency on coal would continue to exist.

twofold. First, this study has shown that electricity production facilities are rather expensive to apply on existing buildings and on a small scale. Their orientation towards sun and wind is often not optimal. This is the case in the hydrogen scenario for the BvL-laan. Hydrogen applications become cheaper with a large direct supply of wind and solar energy. The BvL-laan does not offer sufficient possibilities to collect those energy sources. Second, purchasing green electricity from an electricity company turns out to be cheaper than producing it locally. In this case, the production takes place outside of Amsterdam New-West.

Apart from the assessment of the measures, other aspects that need to be taken into account when developing desirable and attainable sustainable energy packages were emphasised by the dialogue group. These can be summarized in the following bullet points.

- Pay attention to necessary combinations of measures. Often it was stressed that one cannot insulate without providing good ventilation.
- Try to make sure packages are flexible. Does the package leave any room to integrate new or improved energy measures in the future?
- Articulate the starting point behind the scenario or package. This could be reducing CO₂ or substituting fossil fuels. Depending on the aim, the choice for specific measures could differ. One of the participants for example argued that taking CO₂ reduction as a starting point could mean that heat recovery from conventional systems is an interesting option. However, when the main aim is to substitute fossil fuels, this measure turns out less positive. Differing opinions on the desirability of measures could also be caused by the use of different reference frameworks. Some use the current situation as a reference and is happy with every improvement, while others use a desirable future image as a reference and will not settle for less.
- Providing a simple minimal package that can be supplemented with extra measures to make it more desirable or attainable would help to increase the understanding the many different possibilities for SEO.

4.3 Why 70% CO₂ reduction, not 100%?

Central question in this closing section is: Why are we not able to reduce 100% of the CO₂ emissions?

The answer to this question can be found in the calculations behind the scenarios. These calculations are based upon realistic and careful suppositions about of collectively supplied green electricity, city district heating and city district cooling. At the moment, most green electricity is not produced CO₂ neutral. Some types of biomass - a major source for green electricity - have a short carbon cycle, which means that they are not CO₂ neutral (this can be found in the biomass classification NTA 8003). Also, biomass usually contains some elements that are not fully clean. Furthermore, the boilers for peak demand incorporated in city district heating and cooling systems, use oil and gas as well. And it is expected that in the future, residual heat from coal and gas-fired power plants will be used in district heating systems. Even a proportion of all the waste incinerated in plants cannot pass as CO₂ neutral. Because of these reasons, even applying all measures in the scenarios cannot prevent all CO₂ emissions.

The following measures could drive up the CO₂ reduction percentage because these would change the underlying suppositions of the calculations used in the scenarios:

- Guarantee 100% CO₂ neutral biomass.
- Prevent the use coal- and gas-fired residual heat for city district heating.
- Idem, for city district cooling.
- Make sure the pumps that drive the city district heating system are fuelled by green electricity.
- Convert the geysers¹⁵ in Remeijden to connect to the city district heating system, or to the collective heat pumps, when no PVTwins are installed.

¹⁵ The scenario for Remeijden does not include converting geysers. That is why the existing use of gas for hot water still produces CO₂ emissions.

5. Conclusions and recommendations

In this chapter the conclusions and recommendations of the dialogue group are summarized. They will be treated by type:

1. Those relating to content: What level of CO₂ reduction is desirable and attainable for housing renovation? (section 5.1);
2. Those relating to agreements and arrangements: What can and should stakeholders do achieve this target? (section 5.3);
3. Those relating to the dialogue process: What lessons can be learned from the dialogue process itself, and from the ‘peeling method’? (section 5.4).

5.1 Conclusions and recommendations relating to content

What are the aspirations of the dialogue group?

- Self-supporting heat production at the level of a housing complex. This option was considered attainable. In particular heat pumps and – where technically possible – city district heating came out positive. These measures, combined with an optimal insulation package, can yield a CO₂ reduction percentage of 50 or higher.
- Ensuring a more sustainable electricity use. The demand for heat will decline as a result of insulation but it is expected that the use of electricity will be maintained or rise, if only for the fact that the new sustainable heating measures – like heat pumps and city district heating- require extra electricity.
- Informing residents about green electricity and ‘natuurstroom’ (natural electricity). ‘Natuurstroom’ is significantly cleaner than regular green electricity.

Why do the aspirations of the dialogue group refer to housing complexes?

First, because in earlier phases of the dialogue ambitions were formulated to be self-supporting at the level of a housing complex, or if possible even to become a net supplier of energy at this level. Second, to prevent a situation in which some complexes are renovated extensively and yield a high CO₂ reduction percentage to compensate for other complexes where no sustainable measures are implemented.

What are the recommendations of the dialogue group?

The dialogue participants reformulated their aspirations in the following recommendation:

Renovations at the level of a housing complex offer the opportunity to reduce the CO₂-level with 70%. This is achieved through a combination of:

1. Insulation measures,
2. A switch to heat pumps or urban district heating, collective heat pumps being the more attractive solution, and
3. Purchasing green electricity.

These measures can be put into practice with an investment level varying from 15.000 to 35.000 euros per dwelling. Implementing these measures will lower the energy costs for

residents, and improve their living quality directly. Even when the investment costs are partially passed on to tenants through a rent increase, the total living costs for tenants do not have to increase. An additional advantage is that energy prices are disconnected from the rising oil and gas prices.

However, some sustainable energy renovations require extra investments costs, mainly for funding new heat distribution systems within and near building complexes. This could give rise to an ‘unprofitable top’ in investment costs, which means that investment costs exceed saved energy costs. In these cases, the dialogue group advises to negotiate a fair distribution of those costs between all stakeholders involved. Housing associations could take part of the investment costs for their own account. After all, they are social organizations. Raising the rent of residents and/or selling assets could compensate for the remaining part of the investment costs. There is no general rule that investment costs should be compensated for at the same location: on the contrary, investments and profits are situation and location specific.

On top of the above-formulated conclusion, the dialogue group concludes that even a 90% CO₂ reduction is possible. This does require the use of entirely sustainable electricity and heating.

Entirely sustainable electricity (*natuurstroom*) and heating does demand involvement from higher policy levels. Housing associations, city districts, residents, the municipality of Amsterdam and in some instances the national government, should cooperate to guarantee this. In Section 5.3 we will elaborate on this.

The Ecostiler Dialogue focussed only on housing renovation so the recommendations do the same. The aspirations and recommendations can however be placed in a bigger picture for the whole area of Amsterdam New-West. This picture is constructed in the next section. It is important to stress that the dialogue group did not formulate recommendations for this bigger picture.

5.2 The bigger picture for Amsterdam New-West: CO₂ reduction potential

What would be the impact on the CO₂ reduction of Amsterdam New-West if the advised 70% CO₂ reduction at housing renovation were achieved? Can this meet the CO₂ reduction target of 50%? This section will present some calculations to answer these questions. The calculations are based on several assumptions, which will be explained first.

Assumptions

Based on information we received from city districts, it is expected that Amsterdam New-West will have 65.000 dwellings in 2015. 24.300 will be newly built houses, and 20.500 houses will be renovated. According to the municipality of Amsterdam, 15.000 newly built dwellings and 9.000 renovated dwellings will be connected to the urban district heating system the coming years¹⁶. We suppose that at least part of the remaining 20.200 houses belongs to the category ‘high rent’ or ‘owner-occupied house’ but we

¹⁶ Klimaatprogramma Gemeente Amsterdam: Stadswarmte in Nieuw West.
http://www.klimaat.amsterdam.nl/main.php?obj_id=93532886.

have no data to back this supposition. Therefore, we made no assumptions on the CO₂ reduction percentage of this group.

Based on the information above, we have made some assumptions about the CO₂ reduction percentage that will be achieved in 2015 in Amsterdam New-West. For newly built houses for example, the assumption is that those houses that will not be connected to the city district heating system are energy neutral (100% CO₂ reduction) in 2015. Houses that are built from scratch can be orientated optimally to sun and wind, and the outer walls can be equipped with (flexible) solar collectors. This makes the hydrogen option far more efficient and effective. We expect that newly built houses that are connected to the city district heating system will reduce CO₂ emissions by 80%. To determine the CO₂ reduction for renovation buildings, we of course used the assumption that the recommendation of the dialogue group is put into practice, i.e. 70% CO₂ reduction is achieved in 2015.

CO₂ reduction potential for Amsterdam New-West

The tables in this section show the CO₂ reduction potential for Amsterdam New-West as a whole under different circumstances. The first table displays the CO₂ reduction when only the planned connection to the city district heating system comes to pass, without taking other measures.

Table 5.1 CO₂ reduction calculations when only city district heating is taken into account.

	Number of dwellings	CO ₂ Reduction
New buildings on city district heating	15.000	80%
New building without district heating	9.300	0%
Renovated on city district heating	9.000	70%
Renovated without district heating	11.500	0%
Remaining group, no assumptions	20.200	0%
Total number of dwellings	65.000	
Total CO ₂ reduction Amsterdam NW		28,2%

Table 5.1 shows that the 50% reduction target for Amsterdam New-West cannot be met by solely connecting the planned buildings to the city district heating network. Doing so reduces the CO₂ emission with only 28%. *This brings us to the conclusion that city district heating needs to be complemented with other sustainable energy measures to meet the CO₂ reduction target for Amsterdam New-West.*

In the table below the packages of sustainable measures for renovation buildings that are developed in the Ecostiler Dialogue are added to the picture outlined in Table 5.1. Still, no assumption is made about the remaining 20.200 dwellings.

Table 5.2 CO₂ calculations city district heating and Ecostiler renovation packages.

	Number of dwellings	CO ₂ reduction
New buildings on city district heating	15.000	80%
New building without district heating ¹⁷	9.300	100%
Renovated on city district heating	9.000	70%
Renovated without district heating	11.500	70%
Remaining group, no assumptions	20.200	0%
Total number of dwellings	65.000	
Total CO ₂ reduction Amsterdam NW		54,9%

Table 5.2 shows that adding the Ecostiler renovation packages to the city district heating plans, yields a CO₂ reduction of almost 55%. This exceeds the CO₂ reduction target for Amsterdam New-West. Herewith, *this can be seen as a minimal package that should be implemented to meet the Amsterdam New-West policy goals.*

No assumptions are being made for the 20.200 dwellings in Amsterdam New-West that probably for a large part have private owners. Still, we can expect that some of these private owners take sustainable energy measures themselves, in particular a cost effective insulation package. When all private house owners would insulate, a CO₂ reduction of 37% is reached. This would raise the total CO₂ reduction for Amsterdam New-West as a whole to 66%.

The calculations presented above are merely indicative. But they do show the importance of ambitious CO₂ reduction aspirations for cutting back the greenhouse gas emissions in Amsterdam New-West.

Finally, we make a short assessment of the contribution of Amsterdam New-West to the national climate policy. In the following calculations, the assumptions are that 90% can be reduced at renovated buildings and 100% at new buildings, and that city district heating is fuelled by sustainable electricity. On the basis of these assumptions, an overall CO₂ reduction percentage of 70% can be accomplished. This would mean that the absolute reduction that can be attained in Amsterdam New-West could rise to 0,5 megaton CO₂.

5.3 Conclusion and recommendations relating to agreements and arrangements

What should and can different parties do to achieve the aspiration of 70% CO₂ reduction during housing renovation? Such an ambitious aspiration can only be put into practice when different parties are willing to put their shoulder to the wheel. This is why it is important to:

- Portray Amsterdam New-West as a 70% area! Emphasise the uniqueness of the area. Communicate the big opportunities the large-scale renovation projects offer for implementing sustainable energy.

¹⁷ “without city district heating” here means that the hydrogen scenario with heat pumps on sustainable energy is chosen.

- Create enthusiasm. Merely a letter of intention or other agreements on paper does not inspire. All parties should be made aware of the use and value of sustainable energy.

No single party has a monopoly: no party by itself can ascertain that sustainable energy becomes an integral part of housing renovation. Within every organization, there is a small group of people that is concerned with sustainable energy – as appeared from the representation of a diverse array of stakeholders in the dialogue. Colleagues have yet to be convinced. The dialogue group therefore advises to disseminate the results of the Ecostiler Dialogue among different stakeholder groups, so that both at the top, and at lower levels of society, the value of sustainable energy is recognized. In this section, we will consider the opportunities to act for different stakeholders.

Housing associations

- Make an energy-scan of every complex. Examine what sustainable energy measures are already in place and which are not. Improvements are always possible.
- Communicate the results of the Ecostiler Dialogue within associations. What are the implications of the results for the daily work of project leaders? Organize a small symposium directed at housing associations' employees. After all, they should bring the results into practice. It is important to enhance their understanding of sustainable energy.
- Present the results at the Amsterdam Federation for Housing Associations (www.afwc.nl).

City Districts

- City districts can play an important facilitating role. They can adapt the necessary permits to the benefit of sustainable energy. Also, they can anticipate judgements of advisory bodies that often vote against implementation of sustainable energy measures. It is advised to set up agreements around these problems, when necessary at the level of the Amsterdam municipality.
- City districts have a say in area renewal plans. They can – together with housing associations – think about how to realize 70% CO₂ reduction. For example, they can set 70% CO₂ reduction as a precondition for renewal plans. This requires active involvement of local politicians.
- Local politicians can encourage sustainable housing renovations. Trust among citizens can be enhanced by ensuring that research in the area (for example surveys) is conducted by independent organizations. Also, informing residents is an important task of city districts. Geuzenveld/Slotermeer is already involved in a participation project in Slotermeer: the results of the Ecostiler Dialogue can be used in this process.
- Communicate the results of Ecostiler within city districts. What are the implications of the results for the daily work of project leaders? Organize a small symposium for local politicians and public workers. Bring together plan designers, including de “Dienst Milieu- en Bouwtoezicht” (Inspection Department for Environment and Building).
- Present the results of Ecostiler in existing negotiation structures, for example in the city districts' “Stuurgroep Stedelijke Vernieuwing” (Steering group for City Renewal).

Residents

- Residents' permission for (sustainable) renovation is necessary: there is a rule that 70% of the residents must be in agreement with the proposed changes to their building. Good communication and PR can help to raise awareness among residents of sustainable energy. Ecostiler results can be a good source of information.
- Involve residents in an early phase of the planning process around sustainable renovations. Prevent a situation in which residents feel that plans are imposed on them. Trust is an important factor: building trust takes time. When residents are informed about the benefits of sustainable energy, this could even give rise to a situation in which residents themselves encourage their housing association to implement sustainable energy measures during the renovation of their complex.
- Know how to inform residents. CO₂ saving is a very abstract goal. Emphasise their own stake: sustainable energy options could raise the level of comfort and lower the energy bill. Convince residents of the added value of sustainable energy.
- Disseminate the Ecostiler results through "koepelorganisaties" (tenants associations connected to housing associations). Residents often distrust housing associations and have a great deal of confidence in "koepelorganisaties". Those associations should be properly advised by the housing associations. In Amsterdam, tenants associations are gathered at the "Huurlersvereniging Amsterdam" (Tenant association Amsterdam): www.huurlersvereniging-amsterdam.nl.
- Also disseminate the results through local resident organizations. However, those organizations are not widely known among residents.
- Very important: search for publicity. Develop a PR strategy, and communicate this through common media. Enhance the visibility of sustainable energy measures in the city. Start up pilot projects, and broadcast the progress and results of these projects on TV or publish it in papers. Acquaint residents with new technologies.

Housing associations, city districts and residents together

- Examine new forms of cooperation to distribute the costs and benefits of sustainable energy measures. An energy contract that guarantees stable prices for more than one year can relieve residents from fluctuations in energy prices. Benefits can be shared with residents.

Social and health aspects

Participants of the dialogue stressed the importance of social and health aspects. Sustainable energy measures can influence social and health circumstances for residents. For example, renovation activities can cause a great deal of disturbance to residents. Consider the first scenario for the Postjesweg, where the installation of heat pumps requires major construction activities within apartments. To protect residents against potential negative consequences of renovation projects, the "Sociaal Plan Parkstad" (Social Plan for Parkstad) was put into place. This plan includes agreements between housing associations, residents and city districts on financial compensation, substitution accommodation and re-accommodation and arrangements on other social aspects that residents of Amsterdam New-West face during renovation. Participants advice to apply these arrangements generously.

Recommendations on sustainable energy should not only concern CO₂ reduction and costs; the consequences of the measures on the quality of living inside the dwelling should also be taken into account. Participants repeatedly stressed the importance of combined insulation and ventilation. Insulation keeps heat within the building, while in the summer especially the elderly need cooling. Cooling can be provided for by awning, ventilation or dedicated supply. Key questions with the supply of cooling are whether the cooling is sustainable or not, what are the costs involved and how easy it is to use. The sustainability can best be guaranteed at the level of a city district because it is easier to arrange centrally than for each building separately.

The dialogue group formulates the following recommendations on social and health aspects:

- Do not only focus on the CO₂ reduction and associated costs when thinking about sustainable energy. Also consider the consequences of measures on the quality of living inside the dwelling.
- Disturbances as a result of building- and reconstruction activities can be very troublesome to residents. This is no reason to stop every initiative: it is reason to investigate creative solutions to minimize the disturbance. The market is increasingly offering these kinds of solutions.

Institutional changes

The above-mentioned actions from housing associations, city districts and residents are necessary to realize 70% CO₂ reduction. However, these activities alone will not be sufficient. To realize the 70%, some institutional barriers in current energy and rental policy should be removed. This can only be achieved at a higher level: the municipality of Amsterdam or nation-wide. The dialogue participants developed the following recommendations for these policy levels.

For the municipality of Amsterdam:

- Make an inventory of all opportunities to stimulate the decentral production of electricity, together with housing associations, city districts, companies and other stakeholders. What are the possibilities to cost-effectively produce electricity? Make such an endeavour with decisiveness and creativity.
- The municipality could place launching orders at suppliers of solar PV or small wind turbines, to lower the start-up costs for innovative suppliers.
- For sustainable electricity that is not produced locally or decentrally, housing associations could develop collective arrangements. Collectively buying green electricity can provide a good alternative with financial benefits for residents. Again, the preferable option should be buying clean electricity (*'natuurstroom'*), not (co)produced from biomass.
- The municipality has the capabilities to remove institutional barriers in cooperation with energy companies and electricity network managers.

For the national government:

- The dialogue group proposes a change of the system for so-called 'rental points'. With this system, an acceptable rent rate is established. In the future, the system

should focus on the total costs of living (including energy costs) and not only take the rent into account as it does currently.

- The national subsidy to stimulate sustainable energy (SDE), should also encourage the use of self-produced sustainable solar energy to make this a favourable option.
- Highly innovative solutions require Amsterdam New-West to appeal to national financing mechanisms, like the “Unieke Kansen Regeling” (Unique Chances Arrangement). Cooperation between different parties can improve the status of a submitted proposal.

5.4 Appraisal of used methods

During the last meeting of the Ecostiler Dialogue, participants gave their views on the methods used in the dialogue. First, we asked participants for their opinion on the dialogue method, which aimed to enhance the learning process. And second, we asked participants to appraise the methods used to develop concrete packages of sustainable energy renovation packages: the peeling method and the use of scenarios.

In their evaluation, participants indicated they have learned ‘a reasonable amount’ during the dialogue process: they gave a score of 3 on a scale of 1 to 4). They explained this from the diversity of parties represented in the dialogue and the good interaction between parties. The dialogue process itself is appraised with a mark of 7,6 (on a scale of 1 to 10).

Participants positively assessed working with scenarios (mean mark: 7,1). They enjoyed looking at the matter at the level of a housing complex (mean mark 7,4), especially after the first four meetings in which energy measures had been discussed on an abstract level.

The method of peeling suffered more criticism (mean mark 6,7). Every scenario consists of over 20 measures (see section 4.1) and the CO₂ and costs calculations are shown only for the whole package. This is necessary because some measures influence other measures. For example, insulation decreases the demand for heat. When one measure is removed, the influence on the CO₂ reduction and costs is shown only on the aggregated level: the effects of single measures are not shown. Because of this, participants sometimes experienced the scenarios as an information overload: they had a hard time ‘seeing the wood for the trees’. That is why in the sub sessions, to really understand the effect of separate measures, all measures were first removed from the scenario and thereafter included again piece by piece. This resulted in minimal packages of measures that are desirable and attainable for every complex, which can be supplemented with additional measures that are complex specific.

In every scenario contesting measures were included, for example sun boilers and heat pumps. Combining both measures is useless: no additional CO₂ reduction is reached but the costs do rise considerably. The model does not make the competition visible. The only way to discover this is to ‘play’ with the model for quite some time. In the meetings, there was no time to do this.

Using a complex model, requires good and thorough preparations. The IVM tried to capture the key points of every scenario by reducing every scenario to a maximum of 15 measures. Several mistakes have been made during this task.

The above-described experiences give rise to the following recommendations:

- The model should leave out those measures that compete with the key measure of the scenario. Make sure that participants start with a internally consistent package of measures.
- Start the dialogue by developing a minimal package. Next, additional measures can be added to this package. Do not peel, built up!

5.5 Closing remarks

The participants are enthusiastic about the results of the Ecostiler Dialogue and the shared aspirations for the area of Amsterdam New-West. They would like to share the results with the people that actually work with sustainable energy in practice. To this end, workshops and presentations will be held to communicate the results to other stakeholders: housing associations, city districts, residents and other interested parties. Those efforts will enlarge the acceptance of the desirability and viability of sustainable energy measures.

To put the results into practice, bottom-up as well as top-down initiatives are necessary. Therefore it is important to display Amsterdam New-West as an area in which 70% CO₂ reduction will be achieved.

Appendix I. Letter to residents

Duurzame energie in Amsterdam Nieuw West Dialogo tussen bewoners, stadsdelen en woningcorporaties

UW OMGEVING

- Kan door de renovatie van mijn huis de energierekening lager worden?
- Biedt mijn woning na de renovatie meer comfort?
- Is het mogelijk om net als in warme landen zonne-energie te gebruiken voor de warmte of elektriciteit in mijn woning?



Deze en andere mogelijkheden worden besproken in de dialoog over duurzame energie en energiebesparing. De dialoog biedt bewoners in Amsterdam Nieuw West de mogelijkheid om met de stadsdelen en woningcorporaties te praten over de veranderingen aan de woningen op het gebied van energiebesparing en duurzame energiemogelijkheden.

Kortom: U kunt meedenken over wat er in uw omgeving gebeurt op het gebied van duurzame energie.

De dialoog wordt georganiseerd door het Instituut van Milieuvraagstukken (IVM) van de Vrije Universiteit van Amsterdam. Het doel van de dialoog is om te komen tot een pakket van duurzame energiemaatregelen per woningcomplex dat door de bewoners en de andere partijen wordt ondersteund. Het IVM verzorgt de informatie over duurzame energie maatregelen en energiebesparing in de woningen. Mogelijke onderwerpen zijn bijvoorbeeld woningisolatie, energie-installaties (onder andere HR-verwarmingsketel, woningventilatie) en toepassing van duurzame energiebronnen (onder andere zon, wind, biomassa en stadsverwarming).

DIALOOG DEELNEMERS

De dialoog bestaat uit vijf bijeenkomsten van een dagdeel, verspreid over het jaar 2007. De dialoog gaat in januari 2007 van start. Het is voor deelname aan de dialoog niet nodig dat u als deelnemer al veel kennis hebt over duurzame energie maatregelen.

De volgende organisaties zijn gevraagd deel te nemen aan de dialoog:

- Bewonersorganisaties: SBWT, TINT, Migranten Platform, afzonderlijke wijkcentra, bewonerscommissies, bewonerskoepels van woningcorporaties
- De woningcorporaties die actief zijn in Nieuw West.
- De vier betrokken stadsdelen.
- Energie-experts ter ondersteuning



CONTACT

Indien u geïnteresseerd bent en wilt deelnemen aan de dialoog neemt u dan contact op met:
frans.van.der.woerd@ivm.vu.nl 020-5989533 of
claudia.van.der.pol@ivm.vu.nl 020-5988690
 U kunt meer informatie vinden op www.ecostiler.nl

Appendix II. Letter to city districts & housing associations

Duurzame energie in Amsterdam Nieuw West Dialoog tussen bewoners, stadsdelen en woningcorporaties

HALVERING CO₂-UITSTOOT

Halvering van de CO₂-uitstoot in 2015 (ten opzichte van 2002) is één van de doelstellingen bij de renovatie van Amsterdam Nieuw West. Stadsverwarming bij nieuwbouw zal hieraan een grote bijdrage leveren, maar is onvoldoende om de doelstelling te halen. *Ecostiler-Amsterdam* is een onderzoeksproject dat gebruik van duurzame energie (DE) in Amsterdam Nieuw West wil bevorderen. Het project wordt uitgevoerd in het kader van een Europese Concerto onderzoeksprogramma. Energiemaatregelen bij woningrenovatie kunnen een grote bijdrage leveren aan het bereiken van de CO₂-doelstelling. Bij woningrenovatie gaat het namelijk om veel woningen (30.000) met groot verbeterpotentieel. Voor duurzame energie bij woningrenovatie bestaat feitelijk op het moment geen beleid. Kortom, voor DE bij woningrenovatie is nog een wereld te winnen. Om te komen tot een *ambitieuze, realistische en breed gedragen* pakket van duurzame energie opties bij toekomstige woningrenovatie in Nieuw West, zal het Instituut voor Milieuvraagstukken van de Vrije Universiteit (IVM) een *dialoog* opzetten. Betrokken partijen uit Nieuw West zullen in de dialoog gezamenlijk verkennen welke mogelijkheden zij zien voor duurzame energie opties. Er wordt ook aandacht besteedt aan de voor- en nadelen die bij de invoering van deze opties kunnen optreden, in technische, sociale, ruimtelijke en economische zin.

DOELSTELLING

Uit verkennende gesprekken is gebleken dat stadsdelen en woningcorporaties uiteenlopende ambities hebben. Sommigen zijn actief op zoek naar verdergaande toepassing van DE, anderen willen niet verder gaan dan het wettelijk minimum. Bewonersorganisaties hebben over het algemeen weinig vertrouwen in woningcorporaties en energiebedrijven. Zij vrezen te hoge prijzen en voldongen feiten. Resultaat: hoewel er in Nieuw West diverse initiatieven zijn, ontbreekt structurele aandacht voor DE bij woningrenovatie.

Doelstelling van de dialoog is om :

Inzicht te krijgen in de (pakketten van) maatregelen voor duurzame energie, die breed toepasbaar zijn bij woningrenovatie in Amsterdam Nieuw West en ondersteund worden door bewoners, woningcorporaties en stadsdelen.

DIALOOG DEELNEMERS

Aansluitend bij de opvattingen van betrokkenen, gelden voor de dialoog de volgende uitgangspunten:

- Het gaat om maatregelen, die concreet toepasbaar zijn bij woningrenovatie in Nieuw West. Daarom moeten de voorgestelde maatregelen geschikt zijn voor de in Nieuw West kenmerkende woningcomplexen.
- In de dialoog komen zowel energiebesparing als bronnen van duurzame energie aan bod. Mogelijke onderwerpen zijn bijvoorbeeld woningisolatie, energie-installaties (onder andere verwarmingsketel, woningventilatie, warmtepomp) en toepassing van duurzame energiebronnen (onder andere zon, wind, biomassa).
- Het gaat om energiegebruik in de vorm van zowel warmte als elektriciteit. Voor warmte is aansluiting op het nieuwe stadsverwarmingnet een mogelijke optie.
- De voorgestelde maatregelen dragen bij voorkeur tevens bij aan betere woningkwaliteit en hoger wooncomfort.
- Bij keuze van de maatregelen kijken we naar technische en economische haalbaarheid en naar de acceptatie door bewoners. Bij maatregelen die nog niet breed toegepast worden, is het mogelijk om aanbevelingen te doen voor een proef- of pilotproject.

BIJENKOMSTEN IN 2007

De dialoog bestaat naar verwachting uit 5 bijeenkomsten van een dagdeel, verspreid over het jaar 2007. De komende maanden wordt, in samenspraak met de deelnemers, de definitieve opzet van de dialoog vastgesteld. Het is voor deelname aan de dialoog niet nodig dat de deelnemers al veel kennis over duurzame energie maatregelen hebben.

CONTACTPERSONEN

frans.van.der.woerd@ivm.vu.nl 020-5989533 en claudia.van.der.pol@ivm.vu.nl 020-5988690. U kunt meer informatie vinden op www.ecostiler.nl

Appendix III. Interviewed persons and organisations (November 2005 – January 2006)

Instanties

Personen

Stadsdelen c.a.

Geuzenveld-Slotermeer

Hr. T. de Ruijter

Bos en Lommer

Hr. G. Timmer; mw. A. Elzen

Slotervaart

Mw. L. Stricker

Osdorp

Hr. P. Harkema; hr. M. Opdam

Project Management Bureau Amsterdam

Hr. M. Thunnissen

Woningcorporaties

Far West

Hr. L. Marton

Alliantie (v/h De Dageraad)

Hr. A. Hoogvliet; hr. B. Peperzak

Het Oosten

Hr. P. Commandeur

Algemene Woningbouw Vereniging AWW

Hr. P. van der Horst

AFWC Amsterdamse Federatie won.ver.

Hr. J. van der Veer

Bewonersorganisaties

SBWT Duurzame wijkontwikkeling

Hr. R. Bakker; hr. W. Heukelom;
hr. J. Jacobs

Huurdersvereniging Amsterdam HA

Mw. M. Koomen

Milieucentrum Amsterdam MCA

Hr. B. Geurst; hr. E. Knijnenburg

TINT (Turkse migranten)

Mw. P. Nalbantoglu

Migranten Platform

Hr. M. Baba

Appendix IV. List of participants Ecostiler Dialogue

Dialoogdeelnemers

Mevrouw Basten	Stadsdeel Bos & Lommer
Mevrouw Van Gils	Woningbouwcorporatie De Alliantie
De heer Odink	Bewoner
De heer Vos	PvdA deelraadlid in Osdorp
De heer Heukelom	Bewoner & Kerngroep Duurzame Wijkontwikkeling
De heer Ozdemir	Bewoner & Stichting Thuis in Eigen Toekomst (TINT)
De heer Schutte	Stadsdeel Geuzenveld
De heer Van de Voorde	Stadsdeel Osdorp
Mevrouw Gronert	Stadsdeel Osdorp
De heer Van der Hidde	Stadsdeel Slotervaart
De heer Marton	Woningbouwcorporatie Far West
De heer Theissing	Stadsdeel Slotervaart
De heer Visser	Stadsdeel Geuzenveld
De heer Celie	Bewoner & Kerngroep Duurzame Wijkontwikkeling
Mevrouw Kloppenburg	Huurdersorganisatie Palladion
De heer Diepstraten	Stadsdeel Slotervaart
De heer Kroon	Kerngroep Algemene Woningbouwvereniging (AWV)
De heer Jacobs	Amsterdams Steunpunt Wonen (ASW)
De heer Van der Horst	AWV, vastgoedmanager
Mevrouw Verheus	AWV
De heer Otter	BAM Woningbouw Amsterdam
Mevrouw Van Laarhoven	Stadsdeel Geuzenveld
De heer Praamstra	Bewonersmilieuwerkgroep Geuzenveld-Slotermeer
De heer Erdtsieck	Woningbouwcorporatie Rochdale
De heer Hendriks	Woningbouwcorporatie Eigen Haard
De heer Bakker	Kerngroep Duurzame Wijkontwikkeling
De heer Oste	Stadsdeel Slotervaart
De heer Hirsch	HBO Argus

Presentaties

De heer Hof	Europe's Energy Point	
De heer De Haas	Haas & Partners	Toolkit
De heer Sijpheer	ECN	Micro-WKK
De heer Van Amerongen	VA Consult	Zonne-energie
De heer Jongerden	Helianthos	Dunne Film technologie
Mevrouw Cace	RenCom	Windenergie
De heer Voerman	SAM	Stadsverwarming Amsterdam
De heer Dikstaal	ENECO Warmte	Warmteleveringspakket ENECO